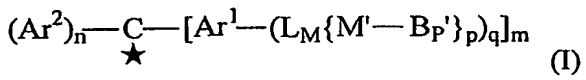
CLAIMS

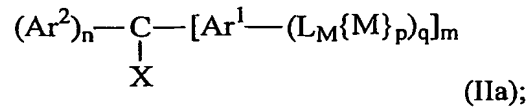
1. A method of forming an ion of formula (I):



(I)

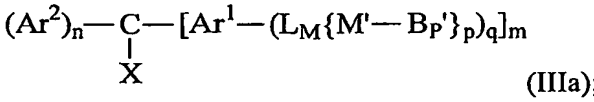
comprising the steps of:

(i) reacting a compound of the formula (IIa):



(IIa);

with a biopolymer, B_P, having at least one group capable of reacting with M to form a covalent linkage, to provide a biopolymer derivative of the formula (IIIa):



(IIIa); and

(ii) cleaving the C—X bond between X and the α-carbon atom of the derivative of formula (IIIa) to form the ion of formula (I);

where:

C★ is a carbon atom bearing a single positive charge or a single negative charge;

X is a group capable of being cleaved from the α-carbon atom to form an ion of formula (I);

M is independently a group capable of reacting with B_P to form the covalent linkage;

B_P' is independently the biopolymer residue of B_P produced on formation of the covalent linkage;

M' is independently the residue of M produced on formation of the covalent linkage;

Ar^1 is independently an aromatic group or an aromatic group substituted with one or more A;

Ar^2 is independently an aromatic group or an aromatic group substituted with one or more A;

optionally wherein (a) two or three of the groups Ar^1 and Ar^2 are linked together by one or more L^5, where L^5 is independently a single bond or a linker atom or group; and/or (b) two or three of the groups Ar^1 and Ar^2 together form an aromatic group or an aromatic group substituted with one or more A;

A is independently a substituent;

L_M is independently a single bond or a linker atom or group;

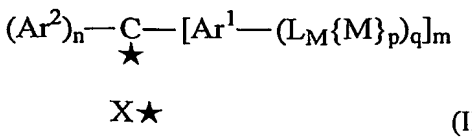
n = 0, 1 or 2 and m = 1, 2, or 3, provided the sum of n+m = 3;

p independently = 1 or more; and

q independently = 1 or more.

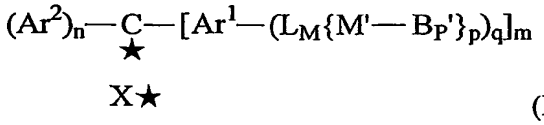
2. A method of forming an ion of formula (I), comprising the steps of:

(i) reacting a compound of the formula (IIb):



(IIb);

with a biopolymer, B_P, having at least one group capable of reacting with M to form a covalent linkage, to provide a biopolymer derivative of the formula (IIIb):



(IIIb); and

dissociating X★ from the derivative of formula (IIIb), to form the ion of formula (I);

where:

X★ is a counter-ion to C★;

and C★, M, B_P', M', Ar^1, Ar^2, L_M, n, m, p and q are as defined in claim 1.

3. A biopolymer derivative of the formula (IIIa).

4. A biopolymer derivative of the formula (IIIb).

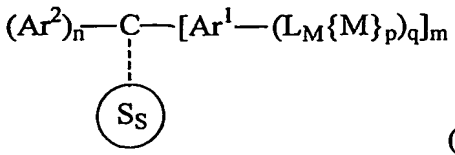
5. An ion of formula (I).

6. A compound of the formula (IIa).

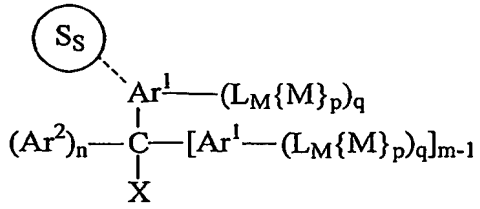
7. A compound of the formula (IIb).

8. A method of forming an ion of formula (I) comprising the steps of:

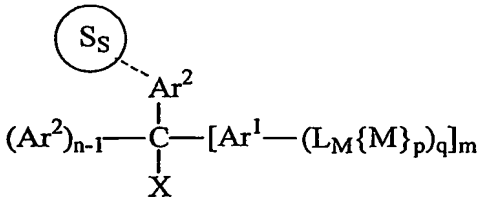
(i) reacting a solid support of formula (IVai), (IVaii), or (IVaiii):



(IVai);

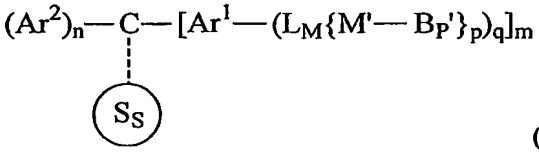


(IVaii);

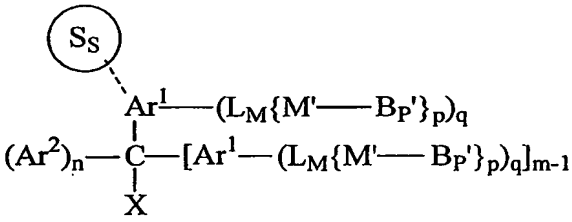


(IVaiii);

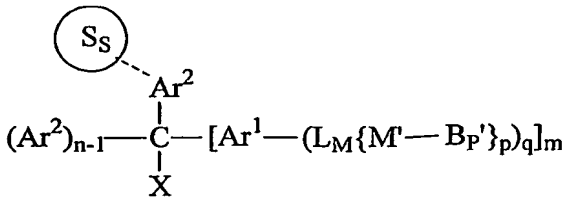
with a biopolymer, B_P, having at least one group capable of reacting with M to form a covalent linkage, to provide a modified solid support of the formula (Vai), (Vaii), or (Vaiii), respectively:



(Vai));



(Vaii);



(Vaiii);

and either:

(iia) for modified solid supports of formula (Vai) cleaving the C-S_S bond between the α-carbon atom of the modified solid support of formula (Vai) and the solid support S_S to form the ion of formula (I);

(iib) for modified solid supports of formula (Vaii), either simultaneously or sequentially, cleaving the C-X bond between X and the α-carbon atom and cleaving the SS- - -Ar1 bond between the solid support and the Ar1 group to form the ion of formula (I); or

(iic) for modified solid supports of formula (Vaiii), either simultaneously or sequentially, cleaving the C-X bond between X and the α-carbon atom and cleaving the SS- - -Ar2 bond between the solid support and the Ar2 group to form the ion of formula (I);

where:

X, Ar^1, Ar^2, B_P', L_M, M, M', n, m, p and q are as defined in claim 1;

S_S is a solid support;

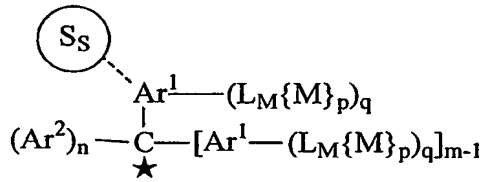
C- - -S_S comprises a cleavable bond between C and S_S;

S_S- - -Ar^1 comprises a cleavable bond between Ar^1 and S_S; and

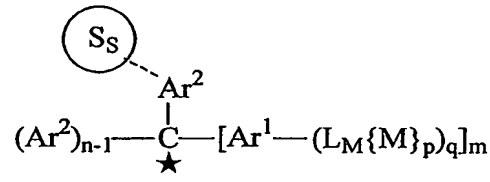
S_S- - -Ar^2 comprises a cleavable bond between Ar^2 and S_S.

9. A method of forming an ion of formula (I) comprising the steps of:

(i) reacting a solid support of formula (IVbii) or (IVbiii):

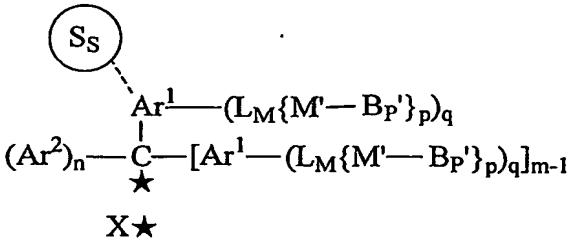


(IVbii);

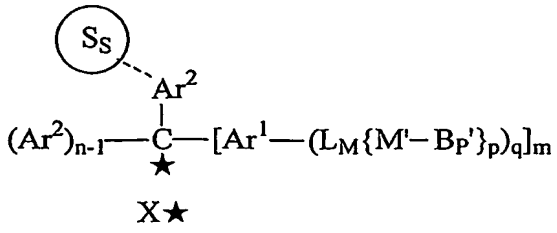


(IVbiii);

with a biopolymer, B_P, having at least one group capable of reacting with M to form a covalent linkage, to provide a modified solid support of the formula (Vbii) or (Vbiii), respectively:



(Vbii);



(Vbiii);

and either:

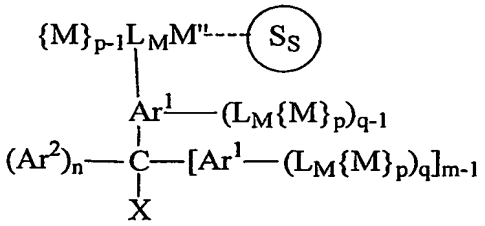
(iia) for modified solid supports of formula (Vbii), either simultaneously or sequentially, dissociating X★ from the derivative of formula (Vbii) and cleaving the S_S- - -Ar^1 bond between the solid support and the Ar^1 group to form an ion of formula (I); or

(iib) for modified solid supports of formula (Vbiii), either simultaneously or sequentially, dissociating X★ from the derivative of formula (Vbiii) and cleaving the S_S- - -Ar^2 bond between the solid support and the Ar^2 group to form an ion of formula (I);

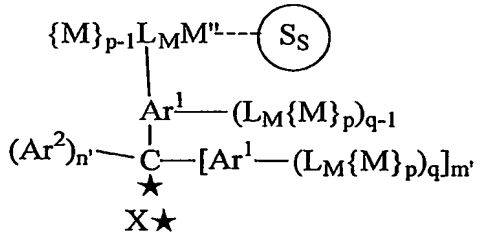
where: X★, Ar^1, Ar^2, B_P', L_M, M, M', n, m, p, q, S_S, C- - -S_S, S_S- - -Ar^1 and S_S- - -Ar^2 are as defined in claim 8.

10. A method of forming an ion of formula (I) comprising the steps of:

(i) reacting a solid support of formula (IVaiv) or (IVbiv):

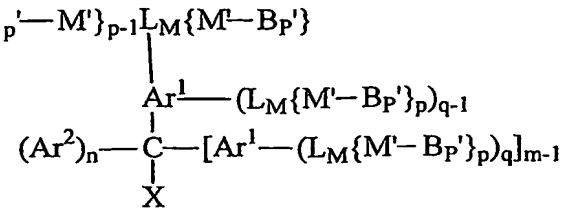


(IVaiv);

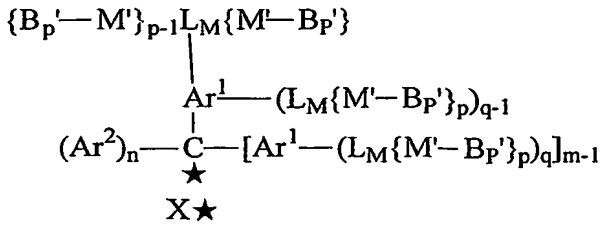


(IVbiv);

with a biopolymer, B_P, having at least one group capable of reacting with M to form a covalent linkage, to provide a modified solid support of the formula (Vaiv) or (Vbiv), respectively:



(Vaiv);



(Vbiv);

and either:

(iia) for modified solid supports of formula (Vaiv), cleaving the C-X bond between X and the α-carbon atom to form the ion of formula (I); or

(iib) for modified solid supports of formula (Vbiv), dissociating X★ from the derivative of formula (Vbiv) to form the ion of formula (I);

where:

X, X★, Ar^1, Ar^2, B_P', L_M, M, M', p, q, n, m, and S_S are as defined in claims 8 and 9;

M"---S_S comprises a bond between M" and S_S; and

M" is the same as M except that S_S is bound to a portion of M which does not form part of M'.

11. A solid support of the formula (IVai), (IVaii), (IVaiii), (IVaiv), (IVbii), (IVbiii) or (IVbiv).

12. A modified solid support of the formula (Vai), (Vaii), (Vaiii), (Vaiv), (Vbii), (Vbiii) or (Vbiv).

13. A method of any of claims 8-10 or a product of claim 11 or 12 wherein the biopolymer is a synthetic biopolymer.

14. A method or product of claim 13 wherein the synthetic biopolymer is an oligonucleotide, a peptide or a carbohydrate.

15. A method for analysing a biopolymer, B_P, comprising the steps of:

(i) reacting the biopolymer B_P with a compound of formula (IIa) or (IIb) or a solid support of formula (IVai), (IVaii), (IVaiii), (IVaiv), (IVbii), (IVbiii) or (IVbiv);

(ii) providing an ion of formula (I); and

(iii) analysing the ion of formula (I) by mass spectrometry.

16. In a method for analysing a biopolymer, B_P, the improvement consisting of: (i) reacting a biopolymer, B_P with a compound of formula (IIa) or (IIb) or a solid support of formula (IVai), (IVaii), (IVaiii), (IVaiv), (IVbii), (IVbiii) or (IVbiv); (ii) providing an ion of formula (I); and (iii) analysing the ion by mass spectrometry.

17. A method of claim 15 or claim 16 wherein the analysis by mass spectrometry is carried out in a spectrometer which is suitable for MALDI-TOF spectrometry.

18. A method of any of claims 1, 2, 8-10 or 13-17 or a product of any of claims 3-7, 11 or 12, wherein C★ bears a single positive charge, such that the ions of formulae (I), (IIb) and (IIIb) have the structures:

Formula (I)	$(Ar^2)_n—\overset{\oplus}{C}—[Ar^1—(L_M—\{M'—B_P'\}_p)_q]_m$
Formula (IIb)	$(Ar^2)_n—\overset{\oplus}{C}—[Ar^1—(L_M—\{M\}_p)_q]_m$ $X\ominus$
Formula (IIIb)	$(Ar^2)_n—\overset{\oplus}{C}—[Ar^1—(L_M—\{M'—B_P'\}_p)_q]_m$ $X\ominus$

19. A method of any of claims 1, 2, 8-10 or 13-18 or a product of any of claims 3-7, 11, 12 or 18 wherein n = 2 and m = 1.

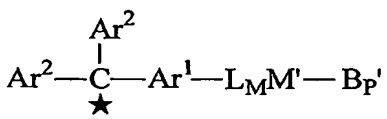
20. A method of any of claims 1, 2, 8-10 or 13-19 or a product of any of claims 3-7, 11, 12, 18 or 19 wherein p = 1, 2 or 3.

21. A method of any of claims 1, 2, 8-10 or 13-20 or a product of any of claims 3-7, 11, 12 or 18-20 wherein p = 1.

22. A method of any of claims 1, 2, 8-10 or 13-21 or a product of any of claims 3-7, 11, 12 or 18-21 wherein q = 1, 2 or 3.

23. A method of any of claims 1, 2, 8-10 or 13-22 or a product of any of claims 3-7, 11, 12 or 18-22 wherein q = 1.

24. A method of any of claims 1, 2, 8-10 or 13-23 or a product of any of claims 3-7, 11, 12 or 18-23 wherein n = 2, m = 1, p = 1 and q = 1, such that the ion of formula (I) has the structure:

Formula (I)	

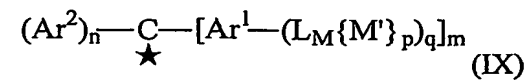
25. A method of any of claims 1, 2, 8-10 or 13-24 or a product of any of claims 3-7, 11, 12 or 18-24 wherein the biopolymer is a polymer found in biological samples.

26. A method or product of claim 25 wherein the biopolymer is a polypeptide, polysaccharide, or polynucleotide.

27. A method or product of claim 26 wherein the biopolymer is a polypeptide.

28. A method or product of any of claims 25-27 wherein the biopolymer does not readily form a molecular ion on illumination of laser light at 340 nm.

29. A method of any of claims 1, 2, 8-10 or 13-28 or a product of any of claims 3-7, 11, 12 or 18-28 wherein the ratio m(B_P') / m(IX) is more than 2, where m(IX) is the mass of the fragment (IX)



(IX)

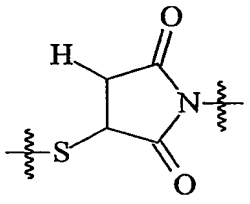
of the cation of formula (I) and m(B_P') is the mass of the biopolymer residue B_P'.

30. A method of any of claims 1, 2, 8-10 or 13-29 or a product of any of claims 3-7, 11, 12 or 18-29 wherein M is: -NR_2; -SR; -OR; -B(R)Y; -BY_2; -$C(R)_2Y$; -$C(R)Y_2$; -CY_3; -C(=Z)Y;

-Z-C(=Z)Y; -C(=Z)R; -C(R)(OH)OR; -C(R)$(OR)_2$; -S(=O)Y; -Z-S(=O)Y; -S$(=O)_2$Y; -Z-S$(=O)_2$Y; -S$(=O)_3$Y; -Z-S$(=O)_3$Y; -P(=Z)(ZR)Y; -P(=Z)Y_2; -Z-P(=Z)(ZR)Y; -Z-P(=Z)Y_2; -P(=Z)(R)Y; -Z-P(=Z)(R)Y; or -N=C(=Z), where Y is independently a leaving group, Z is independently O, S or N(R) and R is independently H, C_{1-8}hydrocarbyl or C_{1-8}hydrocarbyl substituted with one or more A.

31. A method of any of claims 1, 2, 8-10 or 13-29 or a product of any of claims 3-7, 11, 12 or 18-29 wherein M is: -N(R)-; -S-; -O-; -B(Y)-; -C(R)(Y)-; -CY_2-; -C(=O)-; -C(OH)(OR)-; or -$C(OR)_2$-, where Y is independently a leaving group and R is independently H, C_{1-8}hydrocarbyl or C_{1-8}hydrocarbyl substituted with one or more A.

32. A method of any of claims 1, 2, 8-10 or 13-29 or a product of any of claims 3-7, 11, 12 or 18-29 wherein M is: —C(Y)—, where Y is a leaving group.

33. A method of any of claims 1, 2, 8-10 or 13-29 or a product of any of claims 3-7, 11, 12 or 18-29 wherein the covalent linkage is selected from those produced through the reaction of one the following groups: -CO-NH-; biotin-(strept)avidin;  ; or -NH-CS-NH-.

34. A method of any of claims 1, 2, 8-10 or 13-33 or a product of any of claims 3-7, 11, 12 or 18-33 wherein L_M is O or S.

35. A method of any of claims 1, 2, 8-10 or 13-33 or a product of any of claims 3-7, 11, 12 or 18-33 wherein L_M is -E^M-, -$(D^M)_t$-, -$(E^M$-$D^M)_t$-, -$(D^M$-$E^M)_t$-, -E^M-$(D^M$-$E^M)_t$- or -D^M-$(E^M$-$D^M)_t$- (in the orientation Ar^1-$(L_M\{M\}_p)_q$ or Ar^1-$(L_M\{M'\}_p)_q$, as appropriate),

where:

a sufficient number of linking covalent bonds, in addition to the covalent bonds at the chain termini shown, are provided on groups E^M and D^M for linking the p instances of M (or M') groups;

D^M is independently C_{1-8}hydrocarbylene or C_{1-8}hydrocarbylene substituted with one or more A;

E^M (in the orientation Ar^1-$(L_M\{M\}_p)_q$ or Ar^1-$(L_M\{M'\}_p)_q$, as appropriate) is independently -Z^M-, -C(=Z^M)-, -Z^MC(=Z^M)-, -C(=Z^M)Z^M-, -Z^MC(=Z^M)Z^M-, -S(=O)-, -Z^MS(=O)-, -S(=O)Z^M-,

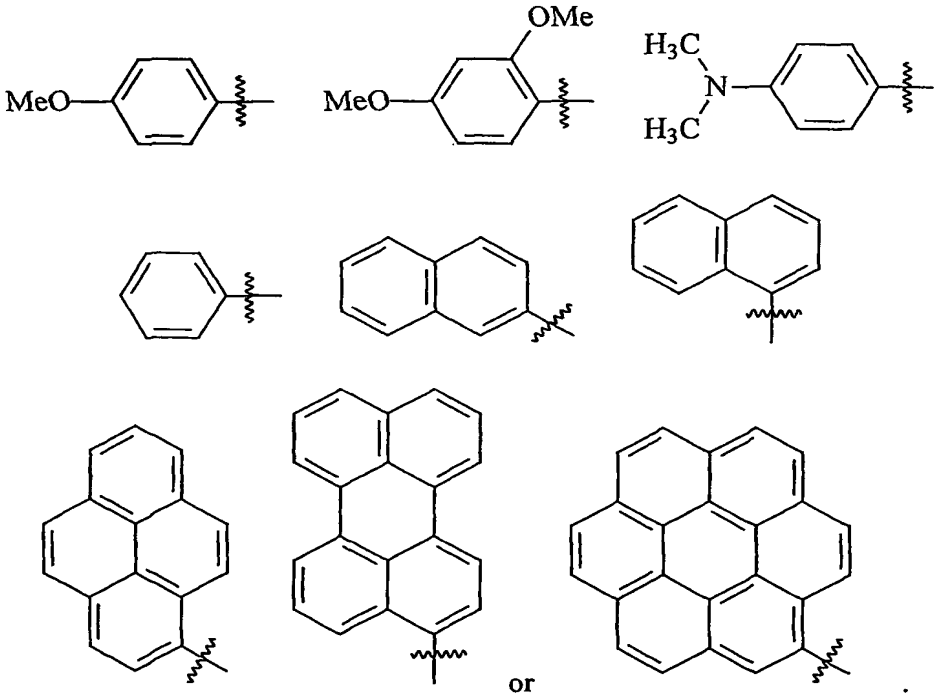
$-Z^MS(=O)Z^M-$, $-S(=O)_2-$, $-Z^MS(=O)_2-$, $-S(=O)_2Z^M-$, $-Z^MS(=O)_2Z^M-$, where Z^M is independently O, S or $N(R^M)$ and where R^M is independently H, C_{1-8}hydrocarbyl (*e.g.* C_{1-8}alkyl) or C_{1-8}hydrocarbyl substituted with one or more A; and

t = 1 or more.

36. A method of any of claims 1, 8, 10 or 13-35 or a product of any of claims 3, 6, 11, 12 or 18-35 wherein the group X is halogen, hydroxy, C_{1-8}hydrocarbyloxy, C_{1-8}hydrocarbyloxy substituted with one or more A, C_{1-8}heterohydrocarbyloxy, C_{1-8}heterohydrocarbyloxy substituted with one or more A, mesyl, tosyl, pentafluorophenyl, -O-succinimidyl -S-succinimidyl, or phenyloxy substituted with one or more A.

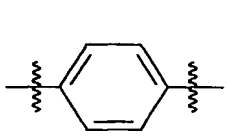
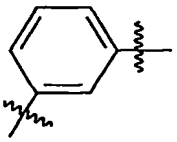
37. A method of any of claims 1, 2, 8-10 or 13-36 or a product of any of claims 3-7, 11, 12 or 18-36 wherein Ar^2 is independently cyclopropyl, cyclopropyl substituted with one or more A, aryl, aryl substituted with one or more A, heteroaryl, or heteroaryl substituted with one or more A.

38. A method of any of claims 1, 2, 8-10 or 13-37 or a product of any of claims 3-7, 11, 12 or 18-37 wherein Ar^2 is



or

39. A method of any of claims 1, 2, 8-10 or 13-38 or a product of any of claims 3-7, 11, 12 or 18-38 wherein Ar^1 is independently cyclopropylene, cyclopropylene substituted with one or more A, arylene, arylene substituted with one or more A, heteroarylene, or heteroarylene substituted with one or more A.

40. A method of any of claims 1, 2, 8-10 or 13-39 or a product of any of claims 3-7, 11, 12 or 18-39 wherein Ar^1 is  or 

41. A method of any of claims 1, 2, 8-10 or 13-40 or a product of any of claims 3-7, 11, 12 or 18-40 wherein L^5 is O or S.

42. A method of any of claims 1, 2, 8-10 or 13-40 or a product of any of claims 3-7, 11, 12 or 18-40 wherein L^5 is $-E^5-$, $-(D^5)_{t'}-$, $-(E^5-D^5)_{t'}-$, $-(D^5-E^5)_{t'}-$, $-E^5-(D^5-E^5)_{t'}-$ or $-D^5-(E^5-D^5)_{t'}-$,

where:

D^5 is independently C_{1-8}hydrocarbylene or C_{1-8}hydrocarbylene substituted with one or more A;

E^5 is independently $-Z^5-$, $-C(=Z^5)-$, $-Z^5C(=Z^5)-$, $-C(=Z^5)Z^5-$, $-Z^5C(=Z^5)Z^5-$, $-S(=O)-$, $-Z^5S(=O)-$, $-S(=O)Z^5-$, $-Z^5S(=O)Z^5-$, $-S(=O)_2-$, $-Z^5S(=O)_2-$, $-S(=O)_2Z^5-$, $-Z^5S(=O)_2Z^5-$, where Z^5 is independently O, S or $N(R^5)$ and where R^5 is independently H, C_{1-8}hydrocarbyl or C_{1-8}hydrocarbyl substituted with one or more A; and

$t' = 1$ or more.